



# Livestock Risk Protection: Feeder Cattle, Fed Cattle, and Swine

FS927: **Matthew A. Diersen**, Extension risk and business management specialist

Livestock Risk Protection (LRP) has been expanded in South Dakota and should meet a variety of risk management needs of cattle and hog producers.

- Producers with a small number of head to protect will find that LRP has a large cost advantage relative to buying put options. Basis risk is also lower, in general, on both feeder cattle and fed cattle.
- The relative cost of LRP versus options can be obtained by using option pricing formulas, but in general they appear to be quite close to one another. Finally, there is less flexibility when using LRP compared to buying put options or to employing complex marketing strategies.
- Advanced risk managers will want to fully understand LRP and may limit its use to when an obvious cost advantage is available.

The Risk Management Agency (RMA) recently announced the expansion of Livestock Risk Protection (LRP) coverage in South Dakota. LRP is a pilot program similar to widely used crop insurance programs administered by the RMA. Relatively high and volatile prices for feeder and fed cattle in recent years will likely generate interest among producers in LRP, as will the added flexibility of feeder cattle coverage.

Feeder cattle, fed cattle, and swine are eligible under LRP. Feeder cattle coverage was available in South Dakota for parts of 2003 and 2004; modifications now allow lighter-weight classes, heifers, dairy, and Brahman cattle to be covered. LRP for fed cattle was extended to South Dakota for the 2005 crop year. The RMA also announced shorter coverage periods to better match backgrounding practices.

LRP is price insurance—paying an indemnity if livestock prices fall below a level specified when the producer purchased LRP coverage. If livestock prices stay steady or increase, then no indemnity is paid. Coverage is similar to buying a put option on the covered commodity. LRP is different from a put, however, in that the federal government subsidizes the premiums, offsetting some of the cost of managing volatile prices, and does not have a lower limit on head covered under LRP.



South Dakota State University  
College of Agriculture and Biological Sciences  
Cooperative Extension Service

## How it works

The process for buying LRP coverage is straightforward. A producer with eligible livestock to protect goes to an insurance agent licensed to offer LRP coverage. The producer fills out paperwork to establish ownership of livestock (an application) and to enter coverage levels and premiums (specific endorsement(s)). The producer then waits until the expiration date to collect any owed indemnity. Unlike with typical crop insurance coverage, the LRP premium is paid at the time coverage is added.

The highest insurance comes with the highest premium cost. Thus, the benefits of greater coverage will need to be weighed against higher costs. The floor or minimum price is the elected price level (in \$/cwt) less the amount of the subsidized premium. The price election level for different types of feeder cattle may be adjusted by a fixed percentage of the typical feeder cattle price level.

Livestock prices will likely change after coverage is purchased. LRP policies settle to national cash prices reported by the Agricultural Marketing Service (AMS) for the respective livestock. If the settlement price falls below the elected price level by the end of the coverage period, then the producer receives an indemnity payment equal to the difference between the final market price and the elected price level. When adjustment factors are used, the ending value is also adjusted and used to compute any indemnity. If the price does not fall below the elected level, then no indemnity is paid.

RMA instituted a number of changes to protect the integrity of the program. Sales of policies may not be available if futures quotes are not available or if relevant futures prices finish the trading day locked in limit change positions. RMA can also suspend sales following two days of multiple futures contracts locked in limit change positions. Because LRP is still a pilot program, RMA also has an "out" clause that more or less says it can halt sales for any major reason whatsoever. Hence, producers must be active risk managers who will need a marketing plan to decide on proper price levels that adequately meet their risk management needs.

## When LRP is appropriate

The LRP subsidy amount, the number of head to be covered, and basis risk from the timing of sales dictate the choice between LRP coverage and buying put options outright.

The subsidy, currently 13% of the premium, should make the coverage cheaper than buying put options in a stable market. If fewer head than a standard contract amount are to be covered, then using LRP will likely be cheaper to obtain. Basis risk may also favor using LRP coverage, especially if the producer is expecting to sell on a date that is more than a month away from a standard option contract expiration date.

The main benefit of LRP coverage is the ability to cover a small number of head of livestock compared to buying put options, such as those traded on the Chicago Mercantile Exchange (CME). For example, consider the premiums for LRP on fed cattle and for live cattle put options from October 1, 2004. The cost of LRP with an

A variety of information and product details are available from crop insurance agents who handle sales of LRP. In addition, LRP policy details are available on the RMA website, <http://www.rma.usda.gov/>. Of particular interest are the LRP Basic Provisions, Specific Coverage Endorsements by class of livestock, Special Provisions by class and state, fact sheets (e.g., Risk Management Agency), and premium schedules. Policy details are available through Crop Policies – 2005. The premiums are available on the Tools/Calculators page under Livestock Reports (LRP) and (LGM).

April 1, 2005, ending date and the \$81.82 per cwt coverage price was \$3.19 per cwt. After the subsidy, the LRP cost is reduced to \$2.78 per cwt. For typical 1,250 lb fed steers or heifers the LRP cost equates to \$34.75 per head.

Similarly, on October 1, 2004, the April live cattle put option with an \$82 strike price settled at \$2.65 per cwt. The April put also expires on April 1, 2005. Assuming a \$60 per contract broker's commission, the cost on the 40,000 lb contract increases by \$0.15 per cwt. The option cost is thus \$1,120 or \$2.80 per cwt or \$35.00 per head.

However, a producer must purchase a whole contract to obtain price protection. If the producer is only trying to cover 20 head instead of 32 head, then the option cost jumps to \$56 per head. While the coverage will still be effective, the producer is over-insured and the expected cost is relatively high. Hence, the LRP coverage will be much cheaper for small lots of livestock.

For standard-weight beef-breed feeder steers, the premium comparison is similar to that for fed cattle. A fixed percentage Price Adjustment Factor (PAF) is used to adjust the basis level for other feeder cattle (Table 1). The PAF for lighter-weight steers (those expected to weigh less than 600 lb at the end of the coverage period) is 110%. Thus, if a price of \$100 per cwt were available for standard-weight steers, then a price of \$110 per cwt would be available for lighter-weight steers. The additional guaranteed adjustment is an advantage compared to cross-hedging lighter-weight steers using feeder cattle option contracts. The PAF also applies to the cost for coverage. Thus, coverage for lighter-weight steers is also 110% of the cost for standard-weight feeders.

**Table 1. LRP feeder cattle price adjustment factors.**

<i>Class</i>	<i>PAF</i>	<i>Class</i>	<i>PAF</i>
< 600# steers	110%	< 600# Brahman	100%
600-900# steers	100%	< 600# Dairy	100%
< 600# heifers	100%	600-900# Brahman	90%
600-900# heifers	90%	600-900# Dairy	80%

The PAF also applies at settlement time. For example, if the settlement price for standard-weight steers drops from \$100 per cwt to \$90 per cwt, the PAF price for lighter-weight steers drops from \$110 per cwt to \$99 per cwt (i.e., 110% of \$90 per cwt). In this case, as the basis narrows the indemnity payment actually increases. This counterintuitive result is because the PAF is a fixed percentage of the standard-weight steer price.

**Table 2. CME feeder cattle index (\$/cwt).**

	<i>Jan</i>	<i>Feb</i>	<i>Mar</i>	<i>Apr</i>	<i>May</i>	<i>Jun</i>	<i>Jul</i>	<i>Aug</i>	<i>Sep</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>
1994	83.34	81.81	81.51	80.00	75.14	73.56	75.96	77.91	73.99	72.35	74.34	75.42
1995	76.23	73.06	68.10	64.99	63.82	65.39	66.10	65.97	65.40	66.21	65.33	65.43
1996	60.14	57.43	56.13	52.83	53.63	59.14	61.44	62.74	63.94	63.25	64.56	65.18
1997	68.53	69.22	68.83	70.86	75.05	77.56	81.18	80.77	79.37	77.08	76.68	77.83
1998	76.98	76.07	74.63	75.13	74.36	72.65	69.92	67.87	67.03	68.58	68.87	66.97
1999	71.52	72.73	71.35	70.48	69.34	74.96	75.65	76.43	78.64	80.00	81.85	84.73
2000	86.23	83.73	83.27	84.19	83.37	85.67	87.86	87.06	85.80	87.06	88.51	90.34
2001	88.61	85.20	85.65	87.85	87.66	90.33	90.84	89.92	90.60	88.41	84.96	84.02
2002	83.36	82.57	80.40	76.23	75.45	75.96	76.98	78.57	80.56	81.20	82.89	85.02
2003	81.90	77.80	76.27	78.73	80.62	85.01	88.70	94.10	100.21	105.25	104.13	100.82

Note: The data reflect the average of the daily CME Feeder Cattle Index, which covers 700-850# No. 1 steers.

**Table 3. South Dakota stocker cattle prices, monthly averages (\$/cwt).**

	<i>Jan</i>	<i>Feb</i>	<i>Mar</i>	<i>Apr</i>	<i>May</i>	<i>Jun</i>	<i>Jul</i>	<i>Aug</i>	<i>Sep</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>
1994	94.44	94.84	96.92	98.58	89.67	85.86	86.90	87.34	80.65	80.90	80.94	81.61
1995	85.59	84.21	81.42	79.93	77.74	78.37	77.48	73.50	69.83	67.98	66.69	67.08
1996	64.08	63.35	62.38	60.33	64.23	65.60	64.46	63.36	67.15	67.39	68.68	68.17
1997	74.43	79.22	83.10	89.70	92.56	92.66	93.95	89.14	87.73	88.82	87.82	90.36
1998	92.03	90.91	92.10	93.72	91.40	85.85	74.81	76.83	73.28	80.72	78.21	79.04
1999	85.19	86.71	86.44	86.99	86.36	91.90	89.01	92.17	91.47	93.90	93.96	98.77
2000	101.87	102.07	104.90	106.47	104.45	106.78	102.65	98.52	100.96	103.82	102.41	102.30
2001	103.27	102.15	104.69	107.30	106.73	113.00	108.55	105.39	100.24	98.46	95.10	99.25
2002	100.45	101.77	100.97	95.98	94.91	92.85	87.93	91.66	93.04	87.77	88.94	94.80
2003	94.20	93.36	96.84	99.02	103.41	105.61	101.47	107.21	112.13	112.71	111.38	111.63

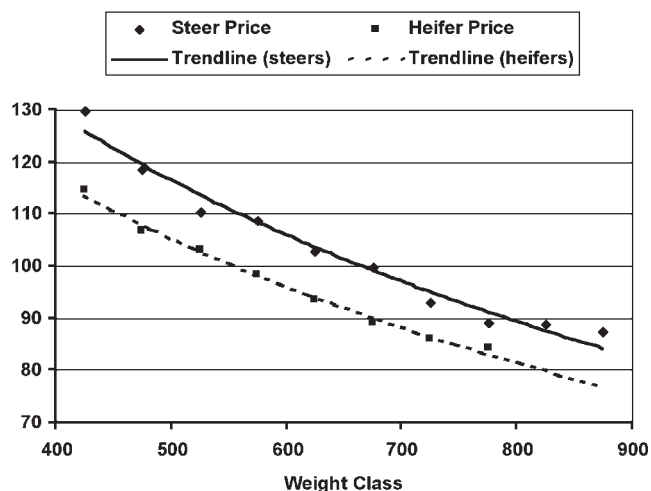
Notes: The data reflect a weighted average of 5-600# No. 1 medium and medium and large steers.  
For 2000, the July entry is the average of June and August.

**Table 4. Ratio of South Dakota stocker cattle price to the CME feeder cattle index.**

	<i>Jan</i>	<i>Feb</i>	<i>Mar</i>	<i>Apr</i>	<i>May</i>	<i>Jun</i>	<i>Jul</i>	<i>Aug</i>	<i>Sep</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>
1994	113	116	119	123	119	117	114	112	109	112	109	108
1995	112	115	120	123	122	120	117	111	107	103	102	103
1996	107	110	111	114	120	111	105	101	105	107	106	105
1997	109	114	121	127	123	119	116	110	111	115	115	116
1998	120	120	123	125	123	118	107	113	109	118	114	118
1999	119	119	121	123	125	123	118	121	116	117	115	117
2000	118	122	126	126	125	125	117	113	118	119	116	113
2001	117	120	122	122	122	125	119	117	111	111	112	118
2002	120	123	126	126	126	122	114	117	115	108	107	112
2003	115	120	127	126	128	124	114	114	112	107	107	111

How realistic are the PAFs for South Dakota? A look at feeder cattle prices from Sioux Falls for January 2004 reveals an understatement of the PAF for lighter-weight steers and heifers (Figure 1). The chart shows observed steer and heifer prices and their corresponding fitted trend lines. The fitted line suggests a price of \$90 per cwt for 775-lb steers. For comparison, that is the weight class reflected in the CME index price, which averaged \$89.40 during January 2004. The fitted line also suggests a price of \$110 per cwt for 550-lb steers, which is 122% of the PAF. The fitted line for heifers suggests prices of \$82 per cwt for 775-lb heifers and \$99 per cwt for 550-lb heifers. Those would be price ratios of 91% and 110% respectively. Regardless, the PAFs do reduce some of the basis risk compared to cross-hedging against feeder cattle futures and options contracts.

**Fig 1. Sioux Falls feeder cattle auction prices from January 2004.**



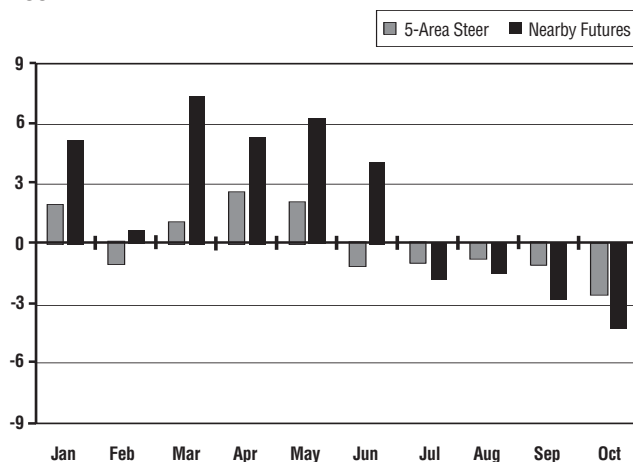
A longer perspective does lend additional credibility to the PAF for lighter-weight steers. The standard settlement for LRP feeder cattle policies is to the CME Feeder Cattle Index. The historic monthly average Index prices show variability over time for feeder cattle prices (Table 2). The price for stocker cattle (500-600-lb steers) has similar variability, but the price relative to the Index is relatively stable (Table 3). However, in several years during the past decade the observed price differential in South Dakota has been below 110% (Table 4). It is quite common during the fall when the largest volume of stocker weight steers is marketed in South Dakota. It is also more common when the general price level for feeder cattle is lower.

LRP premiums are quite close to put option premiums across the different policies and coverage periods. On September 30, 2004, LRP feeder cattle endorsements offered had the same ending dates as the feeder cattle contracts. Thus, it was possible to compare the endorsements to the put options without using an option pricing formula (see Black, 1976, for the most common formula). LRP is only available in increments of 70 to 95% of the "Expected Ending Value," which is near the futures prices with similar expiration dates.

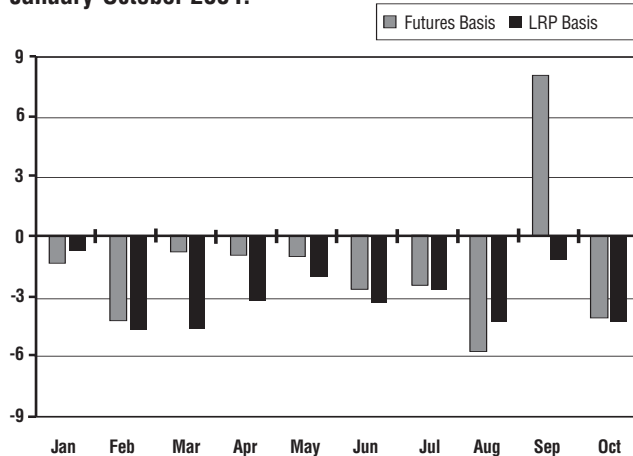
After subtracting the subsidy amount (13%) for coverage levels offered for January, the cost of LRP coverage was within a couple of cents per cwt of the put option premiums before adding in the broker's commission.

LRP policies for fed cattle settle to the weekly AMS 5-Area price for low-choice steers. For comparison, the monthly basis for Sioux Falls steer prices was calculated against the nearby live cattle futures prices and the monthly 5-Area steer prices (Figure 2). The basis tends to be less volatile and closer to zero for the 5-Area price, suggesting that LRP would reduce basis risk for South Dakota producers.

**Fig 2. Sioux Falls fed cattle basis relative to the nearby futures prices and 5-Area steer prices for January-October 2004.**



**Figure 3. Sioux Falls slaughter hog basis relative to nearby futures prices and the CME Lean Hog Index for January-October 2004.**



LRP may reduce the basis risk for swine producers. LRP policies for swine settle to the same prices used to compute the CME Lean Hog Index, which is reported daily based on a 2-day weighted average of prices collected by AMS. The monthly basis for Sioux Falls slaughter hog prices was calculated against the nearby lean hogs futures prices and the monthly average of the CME Lean Hog Index (Figure 3).

The basis is somewhat less volatile on LRP, suggesting that LRP would reduce basis risk compared to using CME futures and options. Mark (2004) found smaller standard deviations and coefficients of variation of expected LRP basis for a number of cash prices compared to basis against the lean hog futures prices.

## Drawbacks

LRP is still a pilot program and it does have some drawbacks. The coverage is equivalent to purchasing out-of-the-money put options. The term “out-of-the-money” means the strike price on put options is below the futures price. This is not a problem as much as it is a limitation. Often there is little profit margin for producers to lock in or protect, and using out-of-the-money protection may not be adequate.

LRP coverage is also similar to European options because the coverage cannot be exercised until the expiration date. If a producer sells covered livestock before the LRP expiration date and prices have decreased to the point that an indemnity payment is expected, there is a risk of prices increasing before the indemnity is calculated. In essence, the producer would face a type of basis risk not present with exchange-traded put options.

LRP coverage is also only good for the last 30 days before the end date. If market prices have declined and a producer with covered livestock wants to sell, the producer would expect an indemnity payment equal to the difference between the LRP elected price and the expected forward price.

The ability to transfer coverage gives policyholders flexibility to sell in the cash market when they deem it appropriate. The coverage should be worth the expected indemnity level discounted by the remaining days until the end date of the LRP coverage. Unfortunately, there are no known transfer records to observe and it seems difficult to see how the coverage could be transferred if the livestock are sold in an auction setting.

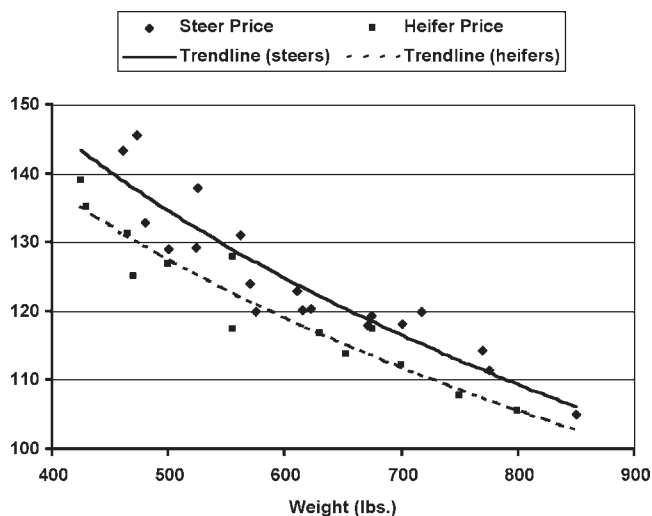
The LRP policy states that no offsetting transactions may be taken. This is ambiguous but reflects earlier experience with government-subsidized risk management programs. The underwriting rules state that selling put options or buying a futures position would represent offsetting positions. Such shortcomings were questioned when the Dairy Options Pilot Program was administered in South Dakota. Put options made little sense for producers that forward contract much of their production (Diersen, 2001). If insurance similar to call options were available, it would facilitate fence or synthetic strategies. With the trend toward more forward contracting of livestock, the LRP regulations will likely come under greater scrutiny.

A limitation of buying LRP coverage or put options is the inability to get a floor price close to current futures or forward prices. Forward prices from the Superior Video Auction show just how much is at stake. The AMS reports the Superior Auction transactions in report number AM\_LS753, available at the AMS website. Prices from September 2004 are plotted against average weights for steers and heifers sold in the North-Central region, which includes cattle sourced in South Dakota (Figure 4). The prices were similar to the previous auction for feeders with an early winter delivery date. The lighter-weight feeders were trading at a slightly larger premium to heavier weight feeders, reflecting the drop in corn prices during August 2004.

## Sales considerations

Until this year, only feeder cattle coverage was available. During the 2003 coverage year, producers in South Dakota only purchased 17 policies covering 1,130 head of feeder cattle. During the 2004 coverage year, only 56 policies were purchased covering 8,327 head. Sales were suspended because of underwriting concerns following the Bovine Spongiform Encephalopathy case.

**Figure 4. AMS-reported Superior Video Auction prices from September 7-10, 2004, for north-central state feeder cattle (medium and large #1) with November through December delivery dates.**



Source: USDA-AMS. Notes: The trend line gives fitted steer prices equal to  $[-53.6 \cdot \ln(\text{weight})] + 476$ . Similarly, the trend line gives fitted heifer prices equal to  $[-46.6 \cdot \ln(\text{weight})] + 417$ .

Regardless, the policies available at the time were actually quite restrictive in terms of their ability to cover any feeder cattle other than beef steers of a narrow weight class. During calendar year 2003 the largest auctions in South Dakota had 108,759 head of feeder steers, so producers protected very few of the potential head.

With the changes in the feeder cattle policy a much larger portion of the South Dakota calf crop, which has averaged 1.8 million head over



the past 5 years, would be eligible to be covered. Producers would not be likely to purchase coverage on replacement heifers, which would somewhat reduce volume to be covered. At the same time, backgrounding calves is a common practice. The addition of other weight classes and heifers should increase demand for LRP coverage, as seen in the sales observed in Sioux Falls (Figure 5).

Cow-calf operators would have calves eligible for coverage that would typically end in the fall of the year. The cow-calf operators could then sell their calves to backgrounders or farmer-feeders who could also purchase coverage until the calves reached a heavy feeder or fed cattle weight. Typical fed cattle marketing totals are 700,000 head per year

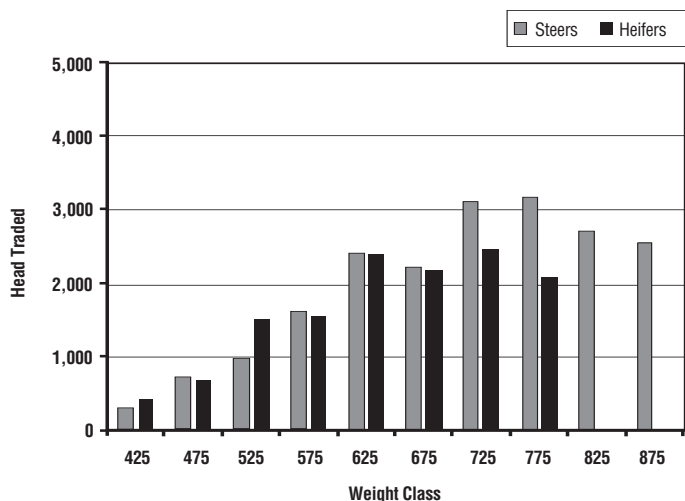
in South Dakota. Thus, different producers may cover the same cattle sequentially under different policies. The effect from an insurance standpoint is the likely presence of multiple customers across the same number of cattle.

Because the shortest endorsement period is 13 weeks, the product will likely only be useful for producers with expected cash sales starting in January of 2005. For example, LRP will likely be of interest to backgrounders and those retaining ownership through finishing. The sales pattern of feeder cattle at the Sioux Falls auction shows heavy trading volume of steers and heifers during the first quarter (Figure 6). The implication is that sales of LRP on standard-weight feeder cattle would likely be heaviest from September through December. At "western" sales locations in South Dakota, large sales of stocker-weight cattle (lighter-weight feeder cattle) are high from October through December. Thus, cow-calf operators would likely demand more LRP coverage from early summer until September. Finally, note that the volume of steers is higher across different months, as many heifers enter herds as replacements.

## References

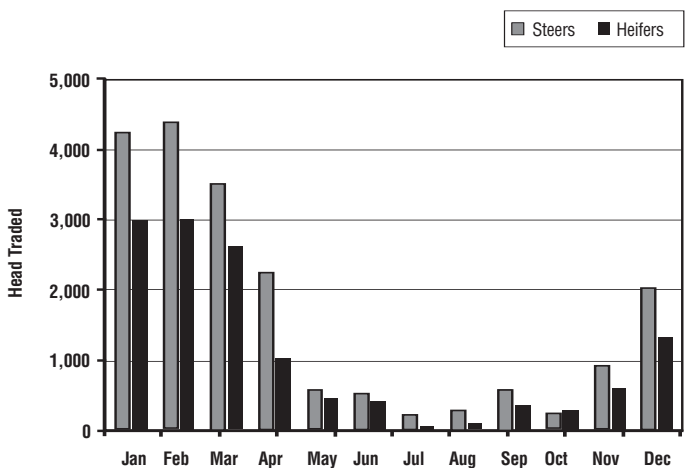
- Black, F. 1976. Pricing of commodity contracts. *J of Financial Economics* (3): 167-179.
- Diersen, M.A. 2001. Using the dairy options pilot program with forward contracts. SDCES ExEx 5037, Cooperative Extension Service, South Dakota State University, August.
- Mark, D.R. 2004. Hedging and basis considerations for swine livestock risk protection insurance. EC04-833, University of Nebraska-Lincoln Cooperative Extension Service.
- Risk Management Agency. 2004. Livestock Risk Protection Insurance pilot program LRP-feeder cattle. USDA Program Aid 1667-09, Revised .

**Figure 5. 2003 Sioux Falls feeder cattle trade by weight class.**



Source: USDA-AMS.

**Figure 6. 2003 Sioux Falls Feeder Cattle Trade by Month.**



Source: USDA-AMS.

Available on the web at: <http://agbiopubs.edu/articles/FS927.pdf>  
 Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the USDA. Gerald Warmann, Director of Extension, Associate Dean, College of Agriculture & Biological Sciences, South Dakota State University, Brookings. SDSU is an Affirmative Action/Equal Opportunity Employer (Male/Female) and offers all benefits, services, and educational and employment opportunities without regard for ancestry, age, race, citizenship, color, creed, religion, gender, disability, national origin, sexual preference, or Vietnam Era veteran status. FS927. 2500 copies printed at a cost of \* each. December 2004.